Proposed Plan for
Solid Waste Management Unit (SWMU) Site M-27
Engineer Proving Ground
Fort Belvoir, Virginia
January 2006

Proposed Plan for Site M-27
Engineer Proving Ground
Fort Belvoir, Virginia

1.0 PURPOSE

This Proposed Plan describes the preferred remedial alternative to address contamination at the Solid Waste Management Unit (SWMU) Site M-27 on the Engineer Proving Ground (EPG) at Fort Belvoir, Virginia. The primary purpose of this Proposed Plan is to inform the public of the preferred remedial alternative and facilitate public involvement in the remedy selection process. The U.S. Army is providing an opportunity for public comment on this Proposed Plan and thus solicits the views of the public on the preferred remedial alternative. Section 8 of this Proposed Plan provides the details on opportunities for community participation.

2.0 SITE BACKGROUND

The U.S. Army Garrison at Fort Belvoir is located in the Commonwealth of Virginia, 14 miles south of Washington, DC. EPG is an 820-acre tract located 1.5 miles northwest of the main post of Fort Belvoir and is roughly bounded on the east by Interstate 95 and by commercial and residential properties on the other three sides. Figure 1 illustrates the EPG property vicinity map.

Figure 2, Site Location and Topographic Map, depicts the EPG boundary and surface topography along with the location of Site M-27 within EPG. Site M-27 is located on Range 1 in the south central portion of western EPG. The general site configuration of Site M-27 is illustrated in Figure 3.

The preferred remedial action was selected in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA), their implementing regulations referred to as the National Contingency Plan (NCP), and Army Regulation 200-1, as applicable.

Historical record research indicates that Site M-27 was used from approximately the mid- to late-1950s for the destruction of a variety of waste ammunitions and explosives. Historical information indicates that the site was defined as a pit measuring approximately 20 feet in diameter and 5 feet deep. A second, somewhat larger pit was observed in a 1968 aerial photograph. This pit was visible east of the existing pit. In the Phase I EBS, soil contamination was assumed and an investigative phase was recommended. In August 1989, an unexploded ordnance (UXO) survey was performed in the area of Site M-27. This survey did not include a specific evaluation of Site M-27 to identify the condition or precise location of any ordnance pit or pits. However, the UXO survey did include an evaluation of the

surrounding range and detected shrapnel debris.

The preferred remedial alternative to address Site M-27 is being proposed by the Army, with support from U.S. EPA Region III (EPA) and the Virginia Department of Environmental Quality (VDEQ).

3.0 SUMMARY OF SITE RISKS

The six explosive contaminants detected in groundwater samples collected from monitoring wells located at SWMU M-27 that exceeded the most recent U.S. EPA Region III Risk Based Concentration (RBCs) tap water values at SWMU M-27 are summarized below:

Contaminant	Maximum Concentration Detected (ug/L)	RBC Tap Water Value (ug/L)
2,4-Dinitrotoluene	0.63	0.098
2,6-Dinitrotoluene	1.4	0.098
2-Amino-4,6-Dinitrotoluene	2.0	0.098
4-Amino-2,6-Dinitrotoluene	2.6	0.098
2,4,6, Trinitrotoluene	4.2	2.2
RDX	75	0.61

There are no promulgated MCLs for any of the detected explosive analytes in the groundwater samples through three phases of sampling and analysis at Site M-27. In absence of a MCL or a risk assessment, the RBCs provide conservative risk screening levels for chemicals detected at Site M-27. Although several detected chemical concentrations exceeded their corresponding RBC tap water values the groundwater in the vicinity of Site M-27 is not used as a source of drinking water.

A risk screening for Site M-27 was conducted by the US Army Center for Health Promotion and Preventive Medicine (CHPPM) based on soil and groundwater sampling data. CHPPM concluded that there should not be any potential health risk to construction workers working on the site.

Site M-27 is partially located within an approximately 165 acre parcel of land that is in the process of being transferred to Commonwealth of Virginia. The future land use of this parcel of land is proposed as a right-of-way (ROW) for the Fairfax County Parkway extension. Roadway construction in the area of Site M-27 would further limit potential exposure to the groundwater.

4.0 PRELIMINARY REMEDIATION GOALS

Preliminary Remediation Goals (PRGs) are based on Applicable or Relevant and Appropriate Requirements (ARARs) and other readily available information. PRGs are refined into final contaminant-specific cleanup levels. The following PRGs have been suggested for this site:

- Attain the RBC tap water values for explosives in groundwater.

The PRGs are presented in Table 1.

5.0 SUMMARY OF REMEDIAL ALTERNATIVES

Remedial alternatives proposed for Site M-27 are:

Alternative 1: No Action.

Capital Costs:	$0
Operations and Maintenance Costs:	$0
Duration:	Not applicable

CERCLA requires that a No Action alternative be evaluated at every site to establish a baseline for the comparison of other remedial alternatives. Under the no action alternative, all contamination at Site M-26 would be left in place, with no actions or controls implemented. There are no costs estimated with this alternative.

Alternative 2: Land use controls and long term monitoring for natural attenuation.

Capital Costs:	$75,000
Operations and Maintenance Costs:	$500,000
Duration:	30 years

A prohibition on all groundwater use from Site M-27 would be imposed until the RBCs for explosives are attained. The chemicals concern and their corresponding RBC values are presented in Table 1. These land use restrictions would be incorporated into real estate documents, including the deed, for transferring ownership from the Army. The Army (or owner of property that is transferred) would regularly verify that there have been no violations of the land use limitations. This alternative would require long term groundwater monitoring to evaluate whether contaminants explosives are attenuating to the RBC value. The cost estimate of $575,000 for this remedial alternative was based on the annual sampling of fifteen monitoring wells.

Alternative 3: Land Use Controls, Zero valent iron passive treatment barrier, and long term monitoring.

Capital Costs:	$750,000
Operations and Maintenance Costs:	$500,000
Duration:	20 years

This action would consist of the installation of an iron filings passive treatment wall. The permeable treatment wall would augment the natural attenuation of the explosive compounds detected at SWMU M-27. A prohibition on all groundwater use from Site M-27 would be imposed until the RBCs for explosives are attained. The chemicals concern and their corresponding RBC values are presented in Table 1. These land use restrictions would be incorporated into real estate documents, including the deed, for transferring ownership from the Army. The Army (or owner of property that is transferred) would regularly verify that there have been no violations of the land use limitations. This alternative would require long term groundwater monitoring to evaluate whether contaminants explosives are attenuating to the RBC values. Cost estimates were based on the installation of the permeable iron barrier and annual sampling of fifteen monitoring wells.

6.0 EVALUATION OF ALTERNATIVES

Under CERCLA and the NCP, nine criteria are used to evaluate the remedial alternatives. These nine criteria fall into three groups: threshold criteria, primary balancing criteria, and modifying criteria. The first two criteria are threshold criteria, which are requirements that each alternative must meet. The next five criteria are balancing criteria which are used to weigh major trade-offs among alternatives. The last two criteria are modifying criteria, which will be fully considered only after public comment is received on the Proposed Plan.

The nine remedy selection criteria are:

- Overall Protection of Human Health and the Environment
- Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)
- Long-Term Effectiveness and Permanence
- Reduction of Toxicity, Mobility, or Volume Through Treatment
- Short-Term Effectiveness
- Implementability
- Cost
- State/Support Agency Acceptance
- Community Acceptance

1. Overall Protection of Human Health and the Environment

Alternatives 2 and 3 ensure protection of human health and the environment. Alternative 2 ensures protection of human health through land use controls, whereas the primary focus of Alternative 3 is the installation of an iron permeable barrier to passively remediate the groundwater. Both address potential future drinking water concerns through monitored

natural attenuation or remediation of the groundwater. Because the "no action" alternative may not be protective of human health and the environment, it was eliminated from consideration under the remaining eight criteria.

2. Compliance with ARARs

There are no promulgated MCLs for any of explosive analytes in the groundwater at Site M-27 and thus a lack of ARARs. In absence of a MCLs or a risk assessment, RBCs provide conservative risk screening levels for chemicals detected at Site M-27. These RBC values will serve as the PRGs. Chemicals of concern and their corresponding PRGs are presented in Table 1.

Alternatives 2 and 3 would meet their respective ARARs from Federal and State laws

3. Long-term Effectiveness and Permanence

Alternatives 2 and 3 will maintain protection of human health and the environment over time. Because both alternatives rely on land use controls (LUCs), monitoring of the LUCs would be necessary to ensure long-term effectiveness and permanence of both alternatives.

4. Reduction of Toxicity, Mobility, or Volume Through Treatment

Alternative 3 does reduce the mobility and volume of contaminants through passive treatment of the groundwater. However, Alternative 2 utilize natural processes to reduce the toxicity and mobility of contaminants in the groundwater.

5. Short-term Effectiveness

Because Alternative 3 involves the remediation of groundwater, it is anticipated that Alternative 3 will attain the RBCs for explosives in a shorter period of time than Alternative 2. While Alternative 3 involves excavation of contaminated groundwater and thus presents a potential for short-term exposure, this short term exposure to the remediation worker will be mitigated through the use of respiratory protection and other appropriate personnel protective equipment such as coveralls and gloves.

6. Implementability

Both Alternatives are readily implementable.

7. Cost

Alternative 2 is estimated to cost $575,000 dollars. Alternative 3 is estimated to cost $1,250,000 dollars.

8. State/Support Agency Acceptance

Both EPA and VDEQ have expressed support for the preferred alternative.

9. Community Acceptance
Community acceptance of the preferred alternative will be evaluated after the public comment period ends.

7.0 PREFERRED ALTERNATIVE

The preferred alternative for Site M-27 is Alternative 2: land use controls, and long-term groundwater monitoring for natural attenuation. Based on 2005 sampling results, the maximum concentration of RDX in December 2005 of 35 ug/L is roughly half the maximum RDX concentration in May 2005 of 75 ug/L. Thus natural attenuation may already exist at a rapid rate. Alternative 3 involves excavation and installation of a treatment wall and thus presents a potential for short-term exposure. This short term exposure to the remediation worker could be mitigated through the use of respiratory protection and other appropriate personnel protective equipment such as coveralls and gloves. The total cost of this action is estimated at $575 thousand dollars. While Alternative 3 would reach end goals in a shorter period of time the additional installation cost may be unnecessary as the explosives are naturally attenuating already. The preferred alternative is protective of human health and the environment, would comply with ARARs, would be cost-effective, and is readily implementable. The preferred alternative can change in response to public comment.

8.0 COMMUNITY PARTICIPATION

The Army is soliciting public comment on the preferred remedial alternative. A thirty (30) day public comment period will occur from **January 20, 2006 to February 21, 2006**. The Army has published a notice of availability of this Proposed Plan in *The Washington Post*, and will hold a public meeting to discuss this Proposed Plan on **February 1, 2006** at 6:30 p.m. at the Fairfax County's South County Government Center, 8350 Richmond Highway, Alexandria, Virginia 22039, in the large conference room.

To submit comments on the Proposed Plan, please send them to:

Department of the Army
U.S. Army Garrison Fort Belvoir
Directorate of Public Works, Environmental and Natural Resource Division
Attn: Marcia Kicos
9430 Jackson Loop, Suite 107
Fort Belvoir, Virginia 20060-5116

Commments can also be submitted by Fax to (703) 806-0622, or provided orally at the public meeting.

The Army also encourages the public to review more detailed information about this site in the Administrative Record located at the following locations:

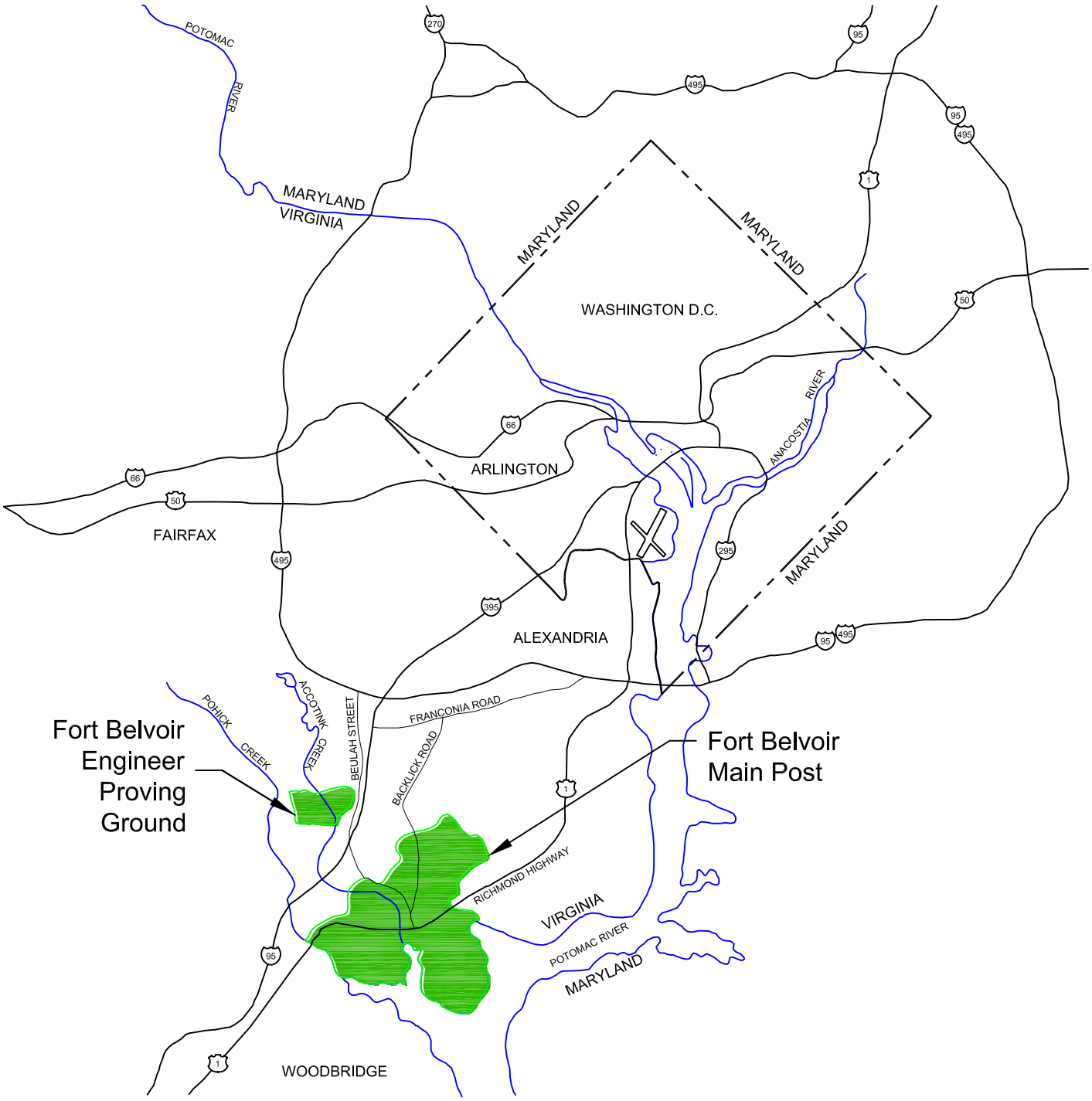
Kingstowne Library
6500 Landsdowne Centre
Alexandria, VA 22315-5011
Telephone: 703-339-4610

Lorton Library
9520 Richmond Highway
Lorton, VA 22079-2124
Telephone: 703-339-7385

Table 1 – EPA Region III Risk-Based Concentrations Tap Water (ug/L)

Explosives:	RBC Value ug/L
2,4-Dinitrotoluene	0.098
2,6-Dinitrotoluene	0.098
2-Amino-4,6-Dinitrotoluene	0.098
4-Amino-2,6-Dinitrotoluene	0.098
2,4,6, Trinitrotoluene	2.2
RDX	0.61

FIGURE 1
SITE VICINITY MAP



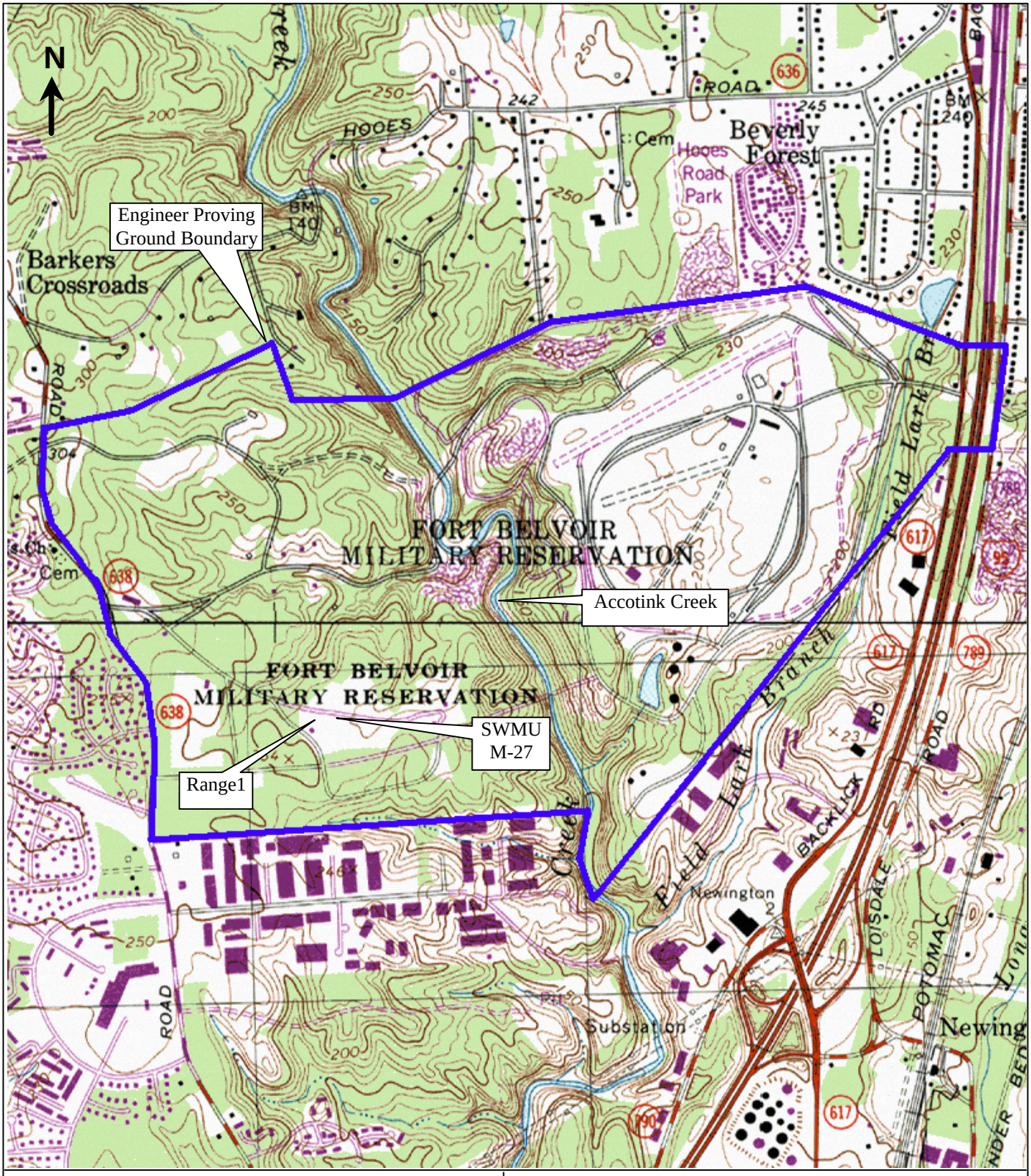
Tetra Tech, Inc.
10306 Eaton Pl., Suite 340
Fairfax, VA 22030
703.385.6000

Site Vicinity Map
Fort Belvoir, Virginia

Not to Scale

Figure 1

FIGURE 2
SOLID WASTE MANAGEMENT UNIT (SWMU) M-27 LOCATION



Sources:
USGS, 1965. Annandale, VA Quadrangle.
Photorevised 1983, 1994.
USGS, 1965. Fort Belvoir, VA – MD Quadrangle.
Photorevised 1980.

Site Location and Topographic Map

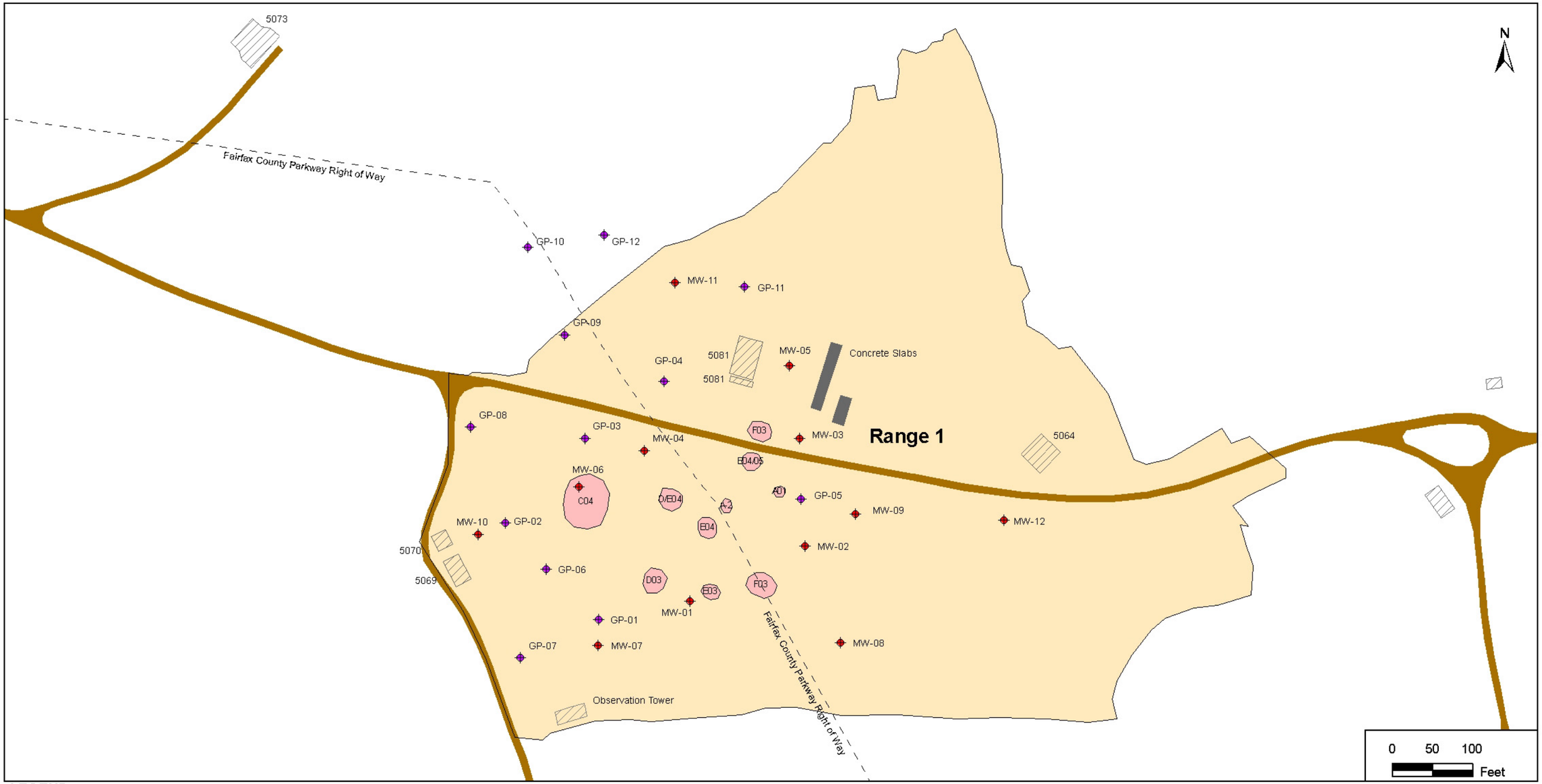
Engineer Proving Ground
Fort Belvoir, Virginia

TETRA TECH, INC.

Scale: 1" = 24,000

Figure 2

FIGURE 3
SOLID WASTE MANAGEMENT UNIT (SWMU) M-27
SITE CONFIGURATION



LEGEND

- Former Burial Pit
- Permanant Monitoring Well
- Temporary Monitoring Well
- Unpaved Road
- Concrete Slabs
- Building
- Fairfax County Parkway Right of Way
- Range 1
- Stream

Source: Fort Belvoir GIS, 2005.

SWMU M-27 Site Configuration

Figure 3